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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/259,762	03/01/1999	ZHIPING YIN	303.531US1	5661

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EXAMINER

DIAZ, JOSE R

ART UNIT PAPER NUMBER

2815

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/259,762

Applicant(s)

YIN ET AL.

Examiner

José R Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-11 and 21-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-11 and 21-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

➤ A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 12, 2003 has been entered.

Claim Objections

➤ Claim 28, 29 and 39 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 28 recites the same limitation disclosed in claim 9. Claims 29 and 39 recite a limitation, which was incorporated in the claim language of the independent claims 21 and 31, respectively.

➤ Claims 31-40 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 21-30. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

- The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

- Claims 1-3 and 5-11 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amended claim 1 recites the new limitation of "an atmosphere free of argon." After a carefully review of the specification, the examiner concluded that the specification does not support such a limitation. For instance, on page 4, lines 21-23 and page 6, lines 4-5 of the specification, applicant clearly discloses a process in which oxygen and "an inert gas" are used to treat the substrate to prevent profile distortion such as footing or undercutting. The art defines the term "inert gas" as a gas formed from the group VIII A, which includes argon (Ar). Thus, nowhere in the specification applicant states that the atmosphere used to treat the substrate is free of an inert gas such as argon. As a matter of fact, the specification supports the use of the inert gas such as argon. Therefore, for purpose of examination the claimed atmosphere will be treated as an atmosphere having an inert gas such as argon. Claims 2-3 and 5-11 are rejected due to their dependency on claim 1.

- The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claim 30 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claims 30 and 40 recite the broad recitation "...adding an inert gas...", and the independent claims 21 and 31 recite adding "helium" which is the narrower statement of the range/limitation.

Claim Rejections - 35 USC § 102

➤ The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

➤ **Claims 1-2, 5-11, 21-22, 24-32, and 34-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Knight et al. (US Pat. No. 5,486,267).**

Regarding claims 1, and 7-9, Knight et al. teaches a method comprising forming a silicon nitride film on a substrate (see col. 1, lines 55-60); treating the film in vacuum of about 3.0-6.5 Torr, for a time of about 10 seconds to about 5 minutes, and in an atmosphere comprising oxygen plasma having a flow rate of at least about 300 sccm oxygen (see col. 2, lines 42-55); and forming and patterning a resist layer (see col. 2, lines 65-67 and col. 3, lines 1-4).

Regarding claims 2, 22 and 32, Knight et al. further teaches an energy source of about 150-900 watts (see col. 2, lines 42-55)

Regarding claims 5-6, 24-25 and 34-35, Knight et al. further teaches that the energy source is RF energy (see col. 2, lines 42-55).

Regarding claim 10, Knight et al. further teaches that the oxygen flow rate is not greater than about 2000 sccm (see col. 2, lines 50-55).

Regarding claim 11, Knight et al. further teaches adding an inert gas to the oxygen gas (see col. 2, lines 37-40).

Regarding claims 21, 26-31, and 36-40, Knight et al. teaches a method comprising forming a silicon nitride film on a substrate (see col. 1, lines 55-60); treating the film in vacuum of about 3.0-6.5 Torr, for a time of about 10 seconds to about 5 minutes, and in an atmosphere comprising oxygen plasma having a flow rate of at least about 300 sccm oxygen to about 2000 sccm and helium in concentration of about 400-1000 sccm (see col. 1, lines 55-60); and forming and patterning a resist layer (see col. 2, lines 65-67 and col. 3, lines 1-4).

➤ **Claims 1-2, 5-11 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Puntambekar (US Pat. No. 5,821,603).**

Regarding claims 1, 7-9 and 28, Puntambekar teaches a method comprising forming a silicon nitride film (42) on a substrate (41) (see Fig. 6A); treating the film in vacuum of about 3.0-6.5 Torr, for a time of about 10 seconds to about 5 minutes, and in an atmosphere comprising oxygen plasma having a flow rate of at least about 300 sccm oxygen (see Table II and col. 6, lines 13-27); and forming and patterning a resist layer (45) (see Figs. 6(a)-6(d)), and col. 6, lines 61-65).

Regarding claims 2, Puntambekar further teaches an energy source of about 150-900 watts (see Table II).

Regarding claims 5-6, Puntambekar further teaches that the energy source is RF energy (see Table II).

Regarding claim 10, Puntambekar further teaches that the oxygen flow rate is not greater than about 2000 sccm (see col. 6, lines 24-26).

Regarding claim 11, Puntambekar further teaches adding an inert gas to the oxygen gas (see Table II).

➤ **Claims 1-3, 5-11 and 21-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Yin et al. (US pat. No. 2002/0140056 A1).**

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding claims 1, 7-9, Yin et al. teaches a method comprising forming a silicon nitride film (7) on a substrate (see Fig. 6); treating the film in vacuum of about 3.0-6.5 Torr, for a time of about 10 seconds to about 5 minutes, and in an atmosphere comprising oxygen plasma having a flow rate of at least about 300 sccm oxygen (see Table II); and forming and patterning a resist layer (3) (see Figs. 7-8).

Regarding claims 2, 22 and 32, Yin et al. further teaches an energy source of about 150-900 watts (see Table II).

Regarding claims 3, 23 and 33, Yin et al. further teaches that the electrodes are about 400-600 mils apart (see Table II).

Regarding claims 5-6, 24-25 and 34-35, Yin et al. further teaches that the energy source is RF energy (see Table II).

Regarding claim 10, Yin et al. further teaches that the oxygen flow rate is not greater than about 2000 sccm (see Table II).

Regarding claim 11, Yin et al. further teaches adding an inert gas to the oxygen gas (see Table II).

Regarding claims 21, 26-31, and 36-40, Yin et al. teaches a method comprising forming a silicon nitride film (7) on a substrate (see Fig. 6); treating the film in vacuum of about 3.0-6.5 Torr, for a time of about 10 seconds to about 5 minutes, and in an atmosphere comprising oxygen plasma having a flow rate of at least about 300 sccm oxygen to about 2000 sccm and helium in concentration of about 400-1000 sccm (see Table II); and forming and patterning a resist layer (3) (see Figs. 7-8).

Claim Rejections - 35 USC § 103

➤ The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

➤ **Claims 3, 23, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al. (US Pat. No. 5,486,267).**

Regarding claims 3, 23 and 33, Knight et al. teaches that the oxygen plasma is made by electromagnetic excitation of oxygen gas by electrodes (see col. 2, lines 42-55). With regards to the separation range of the electrodes, it would have been obvious to one of ordinary skill in the art to provide a degree of separation between electrodes, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

➤ **Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Puntambekar (US Pat. No. 5,821,603).**

Regarding claim 3, Puntambekar teaches that the oxygen plasma is made by electromagnetic excitation of oxygen gas by electrodes (see col. 6, lines 23-30 and Table II). With regards to the separation range of the electrodes, it would have been obvious to one of ordinary skill in the art to provide a degree of separation between the electrodes, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Response to Arguments

➤ Applicant's arguments with respect to claims 1-3, 5-11 and 21-40 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

➤ The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are from the same assignee and disclose treatment for a film surface to reduce footing: Yin et al. (US 2002/0140056 A1 and US Pat. No. 6,174,816 B1). The following references disclose a plasma surface treatment: Konjuh et al. (US Pat. No. 6,051,282); Lin et al. (US Pat. No. 5,807,660); and Cheung et al. (US Pat. No. 6,562,544 B1)

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Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 746-3891 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
June 28, 2003

A handwritten signature in black ink, appearing to read 'Eddie Lee', is positioned above the printed name and title.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800